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The Florida Entomologist

Official Organ of the Florida Entomological Society

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The
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VOL. XXIX SEPTEMBER, 1946 NO. 1

SCREWWORM SURVEY OF THE SOUTHEASTERN STATES IN 1945

W. G. BRUCE, A. L. SMITH, and C. C. SKIPPER
U. S. D. A., Agr. Res. Adm., Bureau of Entomology and Plant Quarantine

A screwworm survey of the Southeastern States was initiated by the Bureau of Entomology and Plant Quarantine in June 1943 and, in cooperation with State agencies, was continued through 1944 and 1945 (Bruce 1944, 1945).

The purposes of the survey were (1) to determine the incidence and relative abundance of screwworms, *Cochliomyia americana* C. & P., (2) to ascertain the amounts of critical insecticides needed for screwworm control, (3) to aid in the proper distribution of these insecticides, and (4) to advise farmers and stockmen of the approved methods and materials for the treatment and prevention of screwworm infestations.

The incidence and relative abundance of screwworms were determined by information obtained from farmers, stockmen, county agricultural agents, veterinarians, teachers and students of vocational agriculture, and other interested agencies.

Screwworms were more widespread and more destructive in the Southeastern States in 1945 than they were in either of the two previous years (Fig. 1). This was due to climatological conditions more favorable to the development and migration of screwworms, to the shipment of infested cattle into uninfested areas, and to the unpreparedness of the stockmen to control screwworms in the most seriously affected areas.

FLORIDA. The screwworm overwintering area, for the winter of 1944-45, was confined to peninsular Florida, the northern limits of which extended through southern Duval and Baker Counties, central Columbia, Suwannee, and Lafayette Counties

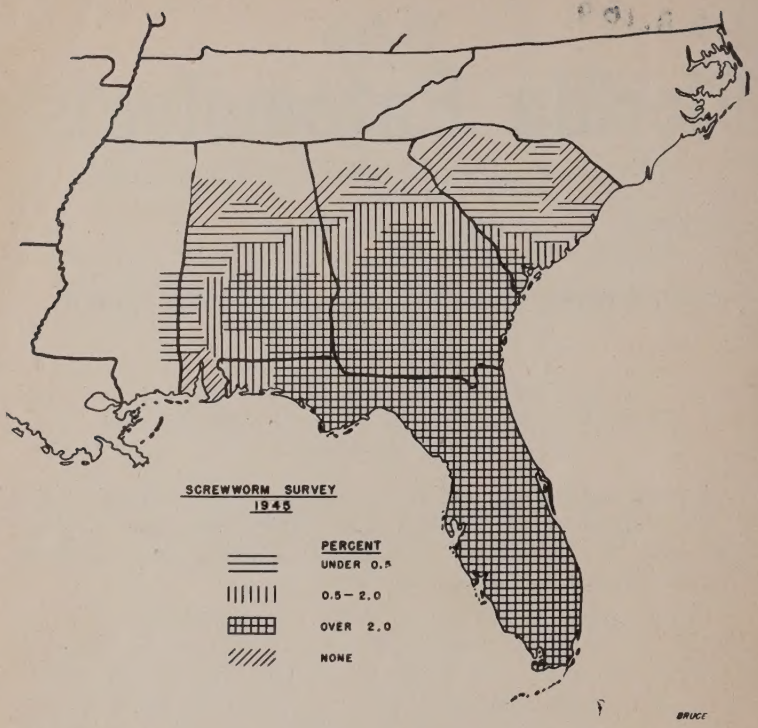

FIGURE 1.

and southern Taylor County. Screwworm surveys during the winter and spring were concentrated in the northern counties of the overwintering area in an effort to delay the usual spring build-up of screwworms and the subsequent northern migration. This procedure was successful in keeping infestations at a minimum beyond the season when most calves are dropped in that area.

The screwworm situation in Florida during 1945 was about the same as in 1944, *i.e.*, generally widespread throughout peninsular Florida but with a minimum of death losses. The stockmen in this area have a year-round screwworm problem, and have learned that continued vigilance is necessary to avoid death losses in their livestock. Infestations in western Florida were higher than in 1944 but did not reach outbreak proportions.

GEORGIA. Unusually heavy infestations were found throughout the southern half of Georgia, some counties reporting the worst outbreak since screwworms first invaded the State. Although the migration from the overwintering area was considerably delayed by intensive surveys, the favorable climatic conditions enabled the screwworms to reach outbreak proportions soon after becoming established in Georgia. Screwworms were especially abundant in the hog-raising sections in the southwestern counties, where 5 percent of the livestock were reported to be infested.

ALABAMA. The heaviest infestation of screwworms in the Southeast was found in Alabama, where stockmen reported it to be the most destructive of all screwworm outbreaks. Infestations in excess of 10 percent were reported, with death losses amounting to as much as 5 percent of the livestock on some farms. The outbreak in central Alabama started well in advance of the natural migration of screwworms from the overwintering area, and evidently resulted from the shipment of infested cattle into that area. Heavy infestations (over 2 percent) were reported in Russell, Macon, Montgomery, Lowndes, Dallas, Wilcox, and the northern portions of Monroe, Conecuh, and Covington Counties. Medium infestations (0.5 to 2 percent) were found in Lee, Chambers, Tallapoosa, Clay, Elmore, Coosa, Autauga, Chilton, Perry, Bibb, Marengo, Clarke, Escambia, and the southern portion of Monroe and Conecuh Counties. Light infestations (less than 0.5 percent) were found in Randolph, Talladega, Shelby, Jefferson, Walker, Tuscaloosa, Pickens, Greene, Hale, Sumter, Choctaw, and Washington Counties.

MISSISSIPPI. A few scattered cases were found in four counties bordering the Alabama line, namely, Greene, Clarke, Wayne, and Lauderdale.

SOUTH CAROLINA. Screwworms were reported to have reached South Carolina in the later part of July. Heavy infestations developed in the southern tip of the State and light, scattered infestations were found in approximately two-thirds of the State.

SUMMARY. Screwworm surveys of the Southeastern States in 1945 revealed widespread infestations in Florida, Georgia, and Alabama and light to heavy infestations in South Carolina. Infestations reached outbreak proportions in Alabama and southwestern Georgia.

Climatic conditions throughout the spring and summer were favorable for screwworm development and migration. The activities of stockmen in practicing approved control measures prevented a more serious outbreak.

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In January, 1946, a letter was received from Dr. Jose S. Camus, Undersecretary of Agriculture and Commerce of the Commonwealth of the Philippines, Manila. He stated that at the outbreak of World War II, the Scientific Library of the Bureau of Sciences, a branch of his Department, had one of the largest and best collections of technical and scientific publications in the Orient. The Library was destroyed by the Japanese during the war. As a start toward rebuilding their Library, he asked that we donate to them whatever publications we could spare.

Ordinarily these matters would have been considered at the business meeting of the Society. However, this would have occasioned great delay, and the Executive Committee thought it advisable to act upon them. All members approved of the exchange with the Florida Academy of Sciences and the exchange of publications has been completed. The committee members were heartily in favor of aiding the Philippine Scientific Library and recommended that a complete set of the Florida Entomologist be sent to the Library and that it be placed on our mailing list for future issues. A set was prepared and sent in May and a letter from Dr. Camus dated August 1, 1946, gratefully acknowledged its receipt and thanked our Society for the gift.

A. N. Tissot, Secretary

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CONTROL OF ADULT SAND FLIES BY AIRPLANE SPRAYING WITH DDT[1]

A. H. MADDEN, A. W. LINDQUIST, O. M. LONGCOY, and E. F. KNIPLING[2]
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Biting midges of the genus *Culicoides* are extremely annoying to man during certain seasons of the year at various points along the southern portion of the Atlantic seaboard. The common name "sand fly" used by people living in these areas is considered appropriate (Dove *et al.* 1932), although the same name usually appears in the literature in connection with the genus *Phlebotomus*. Owing to the importance of these insects from a pest standpoint, and because they are related to those forms which transmit disease, two tests were conducted in Florida in 1945 to determine whether or not airplane spraying with DDT against the adults offered any promise as a means of control.

The first test (test 1) was conducted in Dade County near Miami during the early part of April.[3] The area selected for

[1] This work was conducted under a transfer of funds, recommended by the Committee on Medical Research, from the Office of Scientific Research and Development to the Bureau of Entomology and Plant Quarantine.

[2] Acknowledgment is made of the assistance of Charles Lewis, Charles Wood, Jr., and Bernard Knecht.

[3] Fred H. Stutz, director, and associates of the Dade County Anti-Mosquito District assisted with this test.

the test plot was a 200-acre black mangrove swamp which appeared to be large enough to reduce the factor of migration. Most of the area was favorable for sand fly breeding, and probably the greater part of the adult population present had emerged within the plot. The cover apparently represented a young second growth, being rather low (average height about 20 feet) and fairly open. Cuts 8 to 10 feet wide along the numerous drainage ditches in the area also favored spray penetration from above.

Adult sand fly populations are subject to natural fluctuations in abundance produced by high tides or rainfall. Two weeks previous to this test a peak had occurred, but at the time of the test a decline was in progress. Furthermore, cool weather and high winds before and after treatment reduced the activity of the individuals present. An average of four counts made over a period of 2 days prior to treatment gave a biting rate of 7 per minute. The rate was much lower in the untreated area used as a check, but it remained fairly constant for several days.

The treatment was applied immediately after daybreak under conditions favorable for airplane spraying. A Piper Cub (Army L-4B) airplane equipped with a breaker-bar sprayer designed by C. N. Husman, O. M. Longcoy, and H. S. Hensley was used. This sprayer consists essentially of a 3-foot spray pipe suspended beneath each wing. Each pipe is perforated along the trailing edge by 24 equally spaced holes (No. 71 drill gage). The spray material is driven through these holes under a pressure of 70 pounds per square inch, and strikes against the concave face of a breaker bar fixed at a distance of $\frac{3}{8}$ inch behind the pipe. The combination of force of impact and air turbulence produces a rather fine spray. Application was made at a speed of 60 miles per hour and an altitude of about 40 feet above the cover. The swath width was 80 feet. A spray solution consisting of 5 percent of DDT in No. 2 fuel oil was applied at the rate of 2 quarts per acre.

Observations made in the area during treatment showed that the spray particles penetrated the cover very satisfactorily. No immediate biting inhibition or reduction in numbers of adults was indicated, but they appeared to be activated, at least temporarily, by contact with the spray. Large numbers flew up from the short mangrove shoots along the sides of one of the drainage ditches immediately after the spray particles

landed, but these individuals soon settled and were lost from sight.

The treatment was evaluated by counting the number of bites per minute on the bare forearms. These counts were made between 7:00 and 9:30 a.m., and 7:00 and 8:30 p.m. (Eastern War Time) when the greatest amount of activity occurred. Counts were made before and after treatment in the plot and in a nearby untreated area. As far as possible counts were made simultaneously in the treated and untreated plots. The counts were taken in the central portion of each area to avoid recording the bites of sand flies migrating from other locations. Since the minute size of these insects makes them extremely difficult to see with the unaided eye, a count of the biting rate is more feasible than a count of the landing rate, such as is used in determining the results of airplane spraying against adult mosquitoes (Lindquist *et al.* 1945).

The second test (test 2) was conducted at the Naval Air Gunnery Station, New Smyrna, Fla., during the latter part of July.[4] The area treated consisted of a 200-acre salt marsh covered with scattered clumps of mangrove and a 50-acre plot on which the station buildings and landing field were located. The marsh plot was a portion of a large breeding area and was located directly in front of the station. The principal source of infestation seemed to be located in this area and, therefore, to provide maximum protection, the plot was laid out in the form of a strip 4,224 feet long and 2,000 feet wide. This plot was expected to serve as a barrier against the movement of sand flies into the station area. The treatment over the station was applied at a higher dosage than that applied to the marsh area, to provide residual action against sand flies moving through or around the barrier, or coming in from other breeding areas.

The treatment was applied by a Stearman (Army PT-17) airplane equipped with a breaker-bar sprayer similar to that used on the Cub. The spray pipes were longer, however, and there were 50 (No. 70 gage) holes in each. A solution of 5 percent of DDT and 10 percent of S/V Culicide Oil B (chiefly methyl and polymethyl naphthalenes) in No. 2 fuel oil was used at the rate of 2 quarts per acre over the marsh and 1 gallon per acre over the station. The speed of the airplane was 90 miles per hour and the altitude about 35 to 40 feet above the

[4] Through the courtesy and cooperation of Lt. Comdr. W. P. Voglesang, Officer in Charge.

cover in the marsh area. A swath width of 110 feet was used over the marsh, but this was reduced to about 55 feet over the station area to obtain the higher dosage. The application was made early in the morning when there was no wind and the spray particles settled to the surface satisfactorily. After treatment a readily visible film of oil was noted on pools of water both in the open marsh and under the mangrove trees.

The extent and duration of control in the marsh plot was obtained by the same methods described for the first test. For the practical aspects of the test, observations were made on the length of time the station area was protected from reinfestation.

The results of these tests are presented in Table 1. In general, in test 1 there is close agreement between the percentage control calculated on the basis of the average pretreatment counts and the percentage control calculated on the basis of the average counts made in the untreated area. These data show that there was almost complete control up to the fourth morning after treatment. Supplemental counts (not included in the table) made for 2 weeks after treatment gave some indications of continued reduction throughout this period, but a highly satisfactory degree of control was not maintained beyond 4 days.

In test 2, as calculated on the average pretreatment count, the percentage control remained at a fairly high level for 4 days after treatment. However, there was a rather sharp natural reduction in the population during this same time, as is shown by the records taken in the untreated area used as a check. The percentage control is somewhat lower over the 4-day period when this factor is introduced into the calculation through the use of Abbott's formula. Since there was such a natural decline in population, the results of this test are not conclusive. It is apparent, however, that the initial control was very high, and that the duration of effectiveness of the treatment was somewhat comparable to that obtained in the previous test.

General observations and biting counts in the station area showed that no sand flies were present until 6 days after treatment. At this time the natural reduction had reached such a point that the limited numbers present did not constitute a problem.

TABLE 1.—RESULTS OBTAINED AGAINST ADULT SAND FLIES WITH A 5-PERCENT DDT SOLUTION APPLIED FROM AN AIRPLANE AT THE RATE OF 2 QUARTS PER ACRE.

Date of Application	Counts		Average Bites per Minute		Control in Treated Area Based on—	
	Treated Area	Untreated Area	Treated Area	Untreated Area	Pretreatment Counts	Check Count
	Number	Number	Number	Number	Percent	Percent
Test 1						
Before Treatment						
April						
3 (p.m.)	8	—	8	—	—	—
4 (a.m.)	7	—	18	—	—	—
4 (p.m.)	10	10	0	0	—	—
5 (a.m.)	6	7	3	0.6	—	—
After Treatment						
5 (a.m.)*	17	3	0.06	1.7	99	96
5 (p.m.)	15	13	0.1	0.3	99	67
6 (a.m.)	18	20	0	0	100	—
6 (p.m.)	15	17	0	1.7	100	100
7 (a.m.)**	20	22	0	0.01	100	100
8 (p.m.)	7	15	0	2.04	100	100
9 (a.m.)	12	7	0	0	100	—
10 (a.m.)	11	7	5.7	5.3	21	0
Test 2						
Before Treatment						
July						
26 (p.m.)	21	50	9	5	—	—
27 (a.m.)	23	25	4	6	—	—
After Treatment						
27 (p.m.)	50	50	0.24	2.2	96	90†
28 (a.m.)	50	50	1	2.3	85	64†
31 (p.m.)	50	54	0.7	2	89	70†

* 1 hour after treatment.

** Counts after April 7 were conducted by personnel of the Dade County Anti-Mosquito District.

† Abbott's formula was used in these calculations.

Although these tests show that airplane spraying with DDT is effective against adult sand flies, no indications were obtained of the duration of effectiveness of such treatments under condi-

tions of a rising sand fly population. Little is known concerning the adults of this genus, or of the factors affecting their migration or other activities. It is possible that satisfactory control under all conditions might involve the treatment of larger areas, or the use of higher dosages of DDT. The fluctuations in population and the limited periods of maximum adult abundance increase the difficulties of the problem. Further tests are needed with both airplane and ground spraying equipment.

SUMMARY. Tests were conducted to determine the effectiveness of airplane spraying with DDT against adult sand flies *(Culicoides)*. In the treatment of a 200-acre black mangrove swamp with a 5-percent DDT solution at the rate of 2 quarts per acre, a high degree of control was maintained over a 4-day period and some additional control was indicated up to 2 weeks after treatment. Similar results were obtained with a 5-percent DDT solution applied at the rate of 2 quarts per acre over a 200-acre salt-marsh test plot and 1 gallon per acre over an air station. The treated plot served as a barrier against sand flies moving toward the station. Observations on the station grounds showed that this area received complete protection until 6 days after the treatment was applied. It is concluded that this method of control is promising, but further work is needed to provide additional information on the problem.

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ACTIVITIES OF THE FLORIDA ENTOMOLOGICAL SOCIETY

In October 1945 a letter from the President and Secretary was sent to all members of the Society. It announced plans for an annual meeting and requested the members to supply information indicating whether they would attend the meeting, and if they would present a paper. The replies indicated such a small attendance that it seemed inadvisable to try to hold a meeting in the fall. A second letter inquiring about the desirability of a meeting during the winter or spring, brought forth a very meager response and the Executive Committee deemed it wise to cancel all plans for the meeting.

After the cancellation of the annual meeting, the Executive Committee in conferences and through correspondence decided to hold an election of officers for 1946 by mail ballot. In accord with this decision, President A. C. Brown named a Committee on Nominations consisting of Dr. Homer Hixson, Mr. G. B. Merrill and Dr. T. H. Hubbell, Chairman. The committee selected a slate of candidates, and ballots were prepared and mailed to all active members of the Society. Fifty-six ballots were returned and a count of these showed the following to be elected:

President—H. K. Wallace
Vice-President—Max R. Osburn
Secretary—A. N. Tissot
Editor of the Florida Entomologist—J. R. Watson
Associate Editor—G. B. Merrill
Member of the Executive Committee—R. L. Miller

Also submitted to the members for approval, were two lists of names of persons prepared by the Membership Committee. The committee proposed for Associate Membership the following persons:

Dr. A. Earl Pritchard, State Board of Health, Jacksonville; Dr. D. O. Wolfenbarger, Sub-Tropical Experiment Station, Homestead; Mr. A. L. Smith, Bureau of Entomology and Plant Quarantine, Umatilla; Mr. Ford L. Thompson, City Health Department, Tallahassee.

The committee further proposed that the following Associate Members be raised to full active membership:

Mr. W. G. Bruce, Bureau of Entomology and Plant Quarantine, Savannah, Georgia; Mr. Douglass Burnett, Jr., Winter Park, Florida; Sgt. Nathan B. Carson, Box 3391, Orlando, Florida; Lt. Geo. A. Edwards, Eglin Field, Florida; Miss Margaret Greenwald, Box 3391, Orlando, Florida; Mr. W. A. Morrill, Jr., Atlanta, Georgia; Mr. Fred Morton, Box 3391, Orlando, Florida; Mr. Howard B. Reitmeyer, Bay Pines, Florida; Mr. Wesley Foster Taylor, Jacksonville, Florida; Lt. D. C. Thurman, Jr., State Board of Health, Jacksonville, Florida.

All votes cast were favorable and the persons named were declared elected.

In January, 1945, Mr. C. B. Wisecup resigned as Business Manager-Treasurer when he moved to a distant state. On February 13, President Brown named Dr. J. W. Wilson to the office to complete the unexpired term extending through 1946.

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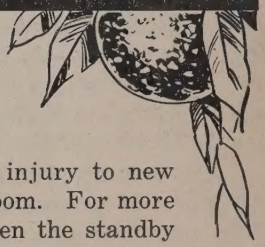

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